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**Geotropism.**—GROTTIÄN<sup>22</sup> finds that by the use of proper concentrations of amyl alcohol and other anesthetics it is possible to stop geotropic response in horizontally placed roots without entirely stopping growth. He believes he has shown that anesthetics may abrogate the power of perception without entirely eliminating the power of reaction. He finds that certain concentrations of the anesthetics accelerate growth, as has been shown by several other investigators. He finds likewise much evidence, though not entirely conclusive, that concentrations which greatly stimulate growth also shorten reaction time.

The same author has repeated all of CZAPEK's experiments on the change of metabolism due to geotropic stimulation. As is well known, CZAPEK claims that geotropically stimulated root tips show a greater percentage of homogentisic acid than unstimulated ones, and that the accumulation is due to the development of an antienzyme which stops the action of the enzyme which carries on the further metabolism of the acid. Several authors have already shown that CZAPEK's method of detecting the acid are not at all reliable, and even that neither tyrosin from which the acid is derived nor the acid itself is present in the root (geotropically stimulated or not) in detectible quantities. GROTTIÄN finds that even CZAPEK's inadequate methods do not give, on the average, any difference between stimulated and unstimulated roots. It seems then that CZAPEK's methods do not indicate any change in the metabolic products due to geotropic stimulation, much less the accumulation of homogentisic acid.—WILLIAM CROCKER.

In 1908 BLAAUW determined that in stimulation by light the presentation time is inversely proportional to the intensity of the light used. The suggestion that the same would be found true with the effective force in stimulation by gravitational and centrifugal acceleration has been tested by Miss C. J. PEKELHARING, who reports<sup>23</sup> that she has established this relation for the same plant under identical conditions with continuous stimulation. This completes the proof that with both sorts of stimuli and with both continuous and intermittent application, the product of the presentation time and the force of the stimulus is a constant. The validity of WEBER's law for geotropic curvatures is questioned, and FITTING's experiments on this point are considered inconclusive. By testing the action of gravity and light together, it appeared that the mode of perception of the two is not the same. There was not the least evidence that positive or negative reaction to gravity could be obtained by increasing or decreasing the strength of the stimulus. One of the most striking results of the investigation has been emphasized by WENT (under whose direction it was conducted) in a separate

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<sup>22</sup> GROTTIÄN, WALTER, Beiträge zur Kenntniss des Geotropism. Beih. Bot. Centralbl. 24:255-285. 1909.

<sup>23</sup> PEKELHARING, CATHARINA J., Onderzoekingen over die perceptie van den zwaartekrachtprrikkel door planten. Proefschrift ter verkrijging van der graad Doctor in die plant- en dierkunde, aan de Rijks-Universiteit te Utrecht. 8vo. pp. 105. pls. 4. 1909.

communication to the Amsterdam Academy.<sup>24</sup> Miss PEKELHARING found it possible, by using potash-alum properly balanced in the culture solution, to grow some roots of *Lepidium sativum* fairly straight and free of starch grains. Nevertheless, these roots, in many cases, showed geotropic curvatures; from which it is evident that there is perception independent of statolith starch, however useful this may be when present.—C. R. B.

**Chromosomes of Taraxacum and Rosa.**—In 1903 RAUNKIAER found that *Taraxacum* developed embryos even when all the anthers had been removed, and a subsequent cytological study by MURBECK and JUEL showed that the embryos developed from the egg without fertilization. A recent study by ROSENBERG<sup>25</sup> shows that in the form called *Taraxacum conjertum* a typical tetrad of megaspores is formed from the megaspore mother cell, and that the reduced number of chromosomes is 8, which can be counted in an early stage as prochromosomes. JUEL had reported 12 or 13 as the reduced number and 26 as the diploid number in apogamous forms of *Taraxacum*.

In several forms of *Rosa* it has been known that embryos develop even when the anthers have been removed, but ROSENBERG is not yet able to say upon cytological evidence whether these forms are apogamous or not. In the pollen mother cells of *Rosa canina* he finds, usually, about 20 univalent chromosomes and 7 bivalent ones. During the first mitosis chromosomes become disarranged, as in *Hemerocallis*, and more than four pollen grains are formed from a single mother cell. He thinks that the suggestion may not be entirely unfounded that the univalent chromosomes, which normally split at the second mitosis, may split at the first, and thus show a transition to the vegetative mode of division. He gives a table showing the relatively high chromosome numbers of apogamous forms.—CHARLES J. CHAMBERLAIN.

**Light and germination.**—HEINRICHER<sup>26</sup> finds, in agreement with REMER, that the seeds of *Phacelia tanacetifolia* are greatly hindered in their germination by light. Seeds just harvested and not first dried out will not germinate at all in white light, nor in the less refrangible rays, while a considerable percentage germinate in darkness and a smaller percentage in the more refrangible rays. A period of drying, whether it occurs in darkness or light, greatly increases germination in darkness and in the more refrangible rays, while it leads to a low percentage of germination in white light and in the less refrangible rays. The behavior of these seeds toward light is in most respects just opposite to that of the seeds of *Veronica peregrina*.

<sup>24</sup> WENT, F. A. F. C., The inadmissibility of the statolith theory of geotropism. Proc. Koninkl. Akad. Wetens. Amsterdam 1909:343-345.

<sup>25</sup> ROSENBERG, O., Ueber die Chromosomenzahlen bei *Taraxacum* und *Rosa*. Svensk. Bot. Tidskrift 3:150-162. figs. 7. 1909.

<sup>26</sup> HEINRICHER, E., Keimung von *Phacelia tanacetifolia* Benth. und das Licht. Bot. Zeit. 67<sup>1</sup>:45-66. 1909.